



Evaluation #

200420-W
(Replaces 200113-W)

Safety & Buildings Division
201 West Washington Avenue
P.O. Box 2658
Madison, WI 53701-2658

Wisconsin Building Products Evaluation

Material

Prefabricated Wood I-Joist
TJI® Joists

Manufacturer

Trus Joist, A Weyerhaeuser Business
PO Box 8449
Boise, ID 83707

SCOPE OF EVALUATION

GENERAL: This report evaluates the use of TJI® Joists manufactured by Trus Joist, A Weyerhaeuser Business, for use as floor joists, rafters, blocking panels and rim joists (structural engineered lumber).

Comm requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings:**

- **Structural:** The TJI® Joists were evaluated for use in dry locations in accordance with **ss. Comm 21.02(3)(a)2.** and **21.19.**

The **IBC** requirements below in accordance with the current **Wisconsin Amended ICC Code:**

- **Structural:** The TJI® Joists were evaluated for use in dry locations in accordance with **ss. IBC 2301.2, 2301.2.1, 2303.1 and 2301.6.1.**

TJI®, Microllam®, TimberStrand®, Performance Plus®, and Trus Joist® are registered trademarks of Trus Joist, A Weyerhaeuser Business, Boise, Idaho.

DESCRIPTION AND USE

The TJI® Joist is a prefabricated wood I-Joist with either Microllam® LVL or TimberStrand® LSL flanges and Performance Plus® OSB webs. Microllam LVL and TimberStrand LSL are manufactured in accordance with the requirements of the Trus Joist manufacturing standards. The Performance Plus OSB web material is manufactured in accordance with DOC Voluntary Product Standard PS2-92 along with further requirements set forth in the Trus Joist manufacturing standard. The adhesives used shall be of the types specified in the Trus Joist manufacturing standard and meet the requirements described in ASTM D2559. Various combinations of flange and web materials are noted in **Table 1**. The web panels have the face grain oriented vertically and the web-to-web connection is either butt jointed or serrated and glued to form a

continuous web. The web-to-flange connection is a proprietary tongue-and-groove glued joint. The top and bottom flanges are placed to create either a constant depth or a constantly varying depth (single taper).

DESIGN

Table 2 specifies allowable moments, reactions, shears, and joist stiffeners (*EI*). Maximum allowable reactions are based on minimum and maximum bearing lengths of 1-3/4, 2-1/2 and 3-1/2 inches, for simple spans; and 3-1/2, 5-1/4 and 7 inches, at intermediate support points for continuous spans. When joists are used as multiple span members, the design shear is the calculated shear at the intermediate support, reduced by the following formula and limited to the depths shown in the table that appears after the formula:

$$R = W \div K \leq 18\%$$

where:

$$K = V_{12} \div 100.$$

R = The percent reduction.

V_{12} = The allowable shear for a 12-inch or 11-7/8-inch deep joist (pounds).

W = The uniform load (plf)

TJI® JOIST SERIES	TJI JOIST DEPTH (inches)	V_{12}	K
TJI 110	≤ 14	1,560	15.60
TJI 210, TJI 230	≤ 16	1,655	16.55
TJI 360	≤ 16	1,705	17.05
TJI 560	≤ 20	2,050	20.50
TJI/L45	≤ 16	1,420	14.20
TJI/L65, TJI/L90, TJI/H90	≤ 24	1,925	19.25
TJI/HD90, TJI/HS90	≤ 24	2,320	23.20

The allowable design shear at the interior supports of multiple-span-member TJI Joists up to 12 inches deep, used in residential floor construction is permitted to be increased an additional 10 percent. This increase of allowable design shear does not apply to the design shear at the ends of the joists.

The repetitive member use factors applicable to the resistive moment capacities listed in **Table 2** of this evaluation report are limited to 1.0.

The top flange of TJI Joists shall be laterally supported at least every 24 inches except that 18 inches is required for joists with flanges 2-inches and less in width. The TJI Joist ends shall be restrained to prevent rollover. End restraint is normally provided by diaphragm sheathing attached to the top flange and to an end wall or a shear transfer panel capable of transferring a minimum force of 50 pounds per foot or the required shear forces due to wind or seismic conditions. Blocking or cross bracing with equivalent strength is permitted.

The joist webs are permitted to have holes as detailed in the allowable hole charts in **Figures 1** and **2** of this evaluation.

Bridging is not required in TJI floor and roof joist applications.

TABLE 1 - TJI® JOIST DESCRIPTION

TJI® Joist Series	Flange Size Depth x Width (inches)	Web Thickness (inches)	Range of Joist Depths (inches)
TJI® 110	1.375 x 1.75	3/8	9-1/2 – 14
TJI® 210	1.375 x 2.08	3/8	9-1/2 – 16
TJI® 230	1.375 x 2.3	3/8	9-1/2 – 16
TJI® 360	1.375 x 2.3	3/8	9-1/2 – 20
TJI® 560	1.375 x 3.5	7/16	9-1/2 – 20
TJI®/L45	1.5 x 1.75	3/8	8 – 20 Taper only
TJI®/L65	1.5 x 2.5	7/16	9-1/2 – 30 (9-1/2 – 30 Taper)
TJI®/L90	1.5 x 3.5	7/16	11-7/8 – 30 (9-1/2 – 30 Taper)
TJI®/H90	1.75 x 3.5	7/16	11-7/8 - 30
TJI®/HD90	2.125 x 3.5	1/2	11-7/8 – 32
TJI®/HS90	2.5 x 3.5	1/2	11-7/8 - 32

TABLE 2 – PROPERTIES FOR TJI JOISTS

BASIC PROPERTIES						REACTION PROPERTIES									
Joist Depth (in.)	Joist Weight (plf)	Resistive Moment (ft.-lbs.) (10)	Vert. Shear (lbs.)	EI x 10 ⁶ lbs.-in. ²	K	END REACTION (lbs.)				INTERMEDIATE REACTION (lbs.)					
						1-3/4" 2-1/2" (9)		3-1/2"		Nails Req'd.	3-1/2" 5-1/4" (7)		5-1/4" 7" (7)		Nails Req'd.
						Bearing Length		Bearing Length			Bearing Length		Bearing Length		
						Web Stiffeners		Web Stiffeners			Web Stiffeners		Web Stiffeners		
						NO	YES	NO	YES		NO	YES	NO	YES	
TJI 110															
9-1/2	2.3	2380	1220	140	4.5	855	NA	1220	NA	NA	1935	NA	2350	NA	NA
11-7/8	2.5	3015	1560	238	4.5	855	1225	1350	1560	3-8d	1935	2295	2350	2705	3-8d
14	2.8	3565	1860	351	4.5	855	1225	1350	1705	3-8d	1935	2295	2350	2705	3-8d
TJI 210															
9-1/2	2.6	2680	1330	167	4.5	980	NA	1330	NA	NA	2145	NA	2565	NA	NA
11-7/8	2.7	3620	1655	283	4.5	980	1340	1435	1655	3-8d	2145	2505	2565	2925	3-8d
14	3.1	4280	1945	415	4.5	980	1340	1435	1790	3-8d	2145	2505	2565	2925	3-8d
16	3.3	4895	2190	566	4.5	980	1340	1435	1970	3-8d	2145	2505	2565	2925	3-8d
TJI 230															
9-1/2	2.7	3175	1330	183	4.5	1035	NA	1330	NA	NA	2410	NA	2790	NA	NA
11-7/8	3.0	4015	1655	310	4.5	1035	1395	1460	1655	3-8d	2410	2765	2790	3150	3-8d
14	3.3	4755	1945	454	4.5	1035	1395	1460	1815	3-8d	2410	2765	2790	3150	3-8d
16	3.5	5440	2190	618	4.5	1035	1395	1460	1815	3-8d	2410	2765	2790	3150	3-8d
TJI 360															
9-1/2	2.7	4790	1425	249	4.5	1080	NA	1425	NA	NA	2460	NA	3000	NA	NA
11-7/8	3.0	6180	1705	419	4.5	1080	1440	1505	1705	3-8d	2460	2815	3000	3360	3-8d
14	3.3	7335	1955	612	4.5	1080	1440	1505	1865	3-8d	2460	2815	3000	3360	3-8d
16	3.5	8405	2190	830	4.5	1080	1440	1505	1865	3-8d	2460	2815	3000	3360	3-8d
18	3.7	9465	2425	1085	4.5	1080	1440	1505	1865	3-8d	2460	2815	3000	3360	3-8d
20	4.0	10515	2660	1376	4.5	1080	1440	1505	1865	3-8d	2460	2815	3000	3360	3-8d
TJI 560															
9-1/2	3.6	7355	1670	378	5.3	1265	NA	1670	NA	NA	3000	NA	3455	NA	NA
11-7/8	4.0	9500	2050	636	5.3	1265	1740	1725	2050	3-16d	3000	3475	3455	3930	3-16d
14	4.2	11275	2390	926	5.3	1265	1740	1725	2200	3-16d	3000	3475	3455	3930	3-16d
16	4.5	12925	2710	1252	5.3	1265	1740	1725	2200	3-16d	3000	3475	3455	3930	3-16d
18	4.8	14550	3030	1631	5.3	1265	1740	1725	2200	3-16d	3000	3475	3455	3930	3-16d
20	5.1	16165	3345	2064	5.3	1265	1740	1725	2200	3-16d	3000	3475	3455	3930	3-16d
TJI/L45															
7-1/2	2.0	2720	860	103	4.5	860	NA	860	NA	NA	2025	NA	2025	NA	NA
9-1/2	2.2	3620	1120	185	4.5	1015	NA	1120	NA	NA	2025	NA	2575	NA	NA
11-7/8	2.5	4685	1420	319	4.5	1015	1225	1420	1420	3-8d	2025	2385	2575	2930	3-8d
14	2.8	5570	1710	474	4.5	1015	1225	1560	1710	3-8d	2025	2385	2575	2930	3-8d
16	3.0	6385	1970	653	4.5	1015	1225	1560	1915	3-8d	2025	2385	2575	2930	3-8d
18	3.2	7200	2155	865	4.5	1015	1225	1560	1915	3-8d	2025	2385	2575	2930	3-8d
20	3.5	8000	2165	1113	4.5	1015	1225	1560	1915	3-8d	2025	2385	2575	2930	3-8d
TJI/L65															
9-1/2	3.0	5215	1675	263	5.3	1375	NA	1675	NA	NA	2745	NA	3365	NA	NA
11-7/8	3.3	6750	1925	450	5.3	1375	1745	1885	1925	3-8d	2745	3120	3365	3735	3-8d
14	3.6	8030	2125	666	5.3	1375	1750	1885	2125	5-8d	2745	3365	3365	3985	5-8d
16	3.9	9210	2330	913	5.3	1375	1750	1885	2330	6-8d	2745	3490	3365	4105	6-8d
18	4.2	10380	2535	1205	5.3	1375	1750	1885	2535	7-8d	2745	3615	3365	4230	7-8d
20	4.4	11540	2740	1545	5.3	NA	1750	NA	2740	8-8d	NA	3740	NA	4355	8-8d
22	4.7	12690	2935	1934	5.3	NA	1750	NA	2935	9-8d	NA	3860	NA	4480	9-8d
24	5.0	13830	3060	2374	5.3	NA	1750	NA	3060	10-8d	NA	3875	NA	4605	10-8d
26	5.3	14960	2900	2868	5.3	NA	1750	NA	2900	11-8d	NA (7)	4725(7)	NA (7)	5345(7)	11-8d
28	5.5	16085	2900	3417	5.3	NA	1750	NA	2900	12-8d	NA (7)	4850(7)	NA (7)	5470(7)	12-8d
30	5.8	17205	2900	4025	5.3	NA	1750	NA	2900	13-8d	NA (7)	4975(7)	NA (7)	5590(7)	13-8d
TJI/L90															
9-1/2	3.8	7415	1675	365	5.3	1400	NA	1675	NA	NA	3350	NA	3965	NA	NA
11-7/8	4.2	9605	1925	621	5.3	1400	1715	1885	1925	2-16d	3350	3665	3965	4285	2-16d
14	4.5	11430	2125	913	5.3	1400	1875	1885	2125	3-16d	3350	3825	3965	4440	3-16d
16	4.7	13115	2330	1246	5.3	1400	2030	1885	2330	4-16d	3350	3980	3965	4600	4-16d
18	5.0	14785	2535	1635	5.3	1400	2030	1885	2515	4-16d	3350	3980	3965	4600	4-16d
20	5.3	16435	2740	2085	5.3	NA	2190	NA	2675	5-16d	NA	4140	NA	4755	5-16d
22	5.6	18075	2935	2597	5.3	NA	2345	NA	2830	6-16d	NA	5090	NA	5705	11-16d
24	5.8	19700	3060	3172	5.3	NA	2345	NA	2830	6-16d	NA	5405	NA	6020	13-16d
26	6.1	21315	2900	3814	5.3	NA	2450	NA	2900	7-16d	NA (7)	5800(7)	NA (7)	5800(7)	14-16d
28	6.4	22915	2900	4525	5.3	NA	2450	NA	2900	8-16d	NA (7)	5800(7)	NA (7)	5800(7)	15-16d
30	6.6	24510	2900	5306	5.3	NA	2450	NA	2900	8-16d	NA (7)	5800(7)	NA (7)	5800(7)	17-16d

See notes at the end of the table.

TABLE 2 – CONTINUED Page 2

BASIC PROPERTIES						REACTION PROPERTIES									
Joist Depth (in.)	Joist Weight (plf)	Resistive Moment (ft.-lbs.) (10)	Vert. Shear (lbs.)	EI x 10 ⁶ lbs.-in. ²	K	END REACTION (lbs.)					INTERMEDIATE REACTION (lbs.)				
						1-3/4" 2-1/2" (9)		3-1/2"		Nails Req'd.	3-1/2" 5-1/4" (7)		5-1/4" 7" (7)		Nails Req'd.
						Bearing Length		Bearing Length			Bearing Length		Bearing Length		
						Web Stiffeners		Web Stiffeners			Web Stiffeners		Web Stiffeners		
		NO		YES		NO		YES		NO		YES			
TJI/H90															
11-7/8	4.6	10960	1925	687	5.3	1400	1715	1885	1925	2-16d	3495	3810	4100	4420	2-16d
14	4.9	13090	2125	1015	5.3	1400	1875	1885	2125	3-16d	3495	3970	4100	4575	3-16d
16	5.2	15065	2330	1389	5.3	1400	2030	1885	2330	4-16d	3495	4130	4100	4735	4-16d
18	5.4	17010	2535	1827	5.3	1400	2030	1885	2515	4-16d	3495	4130	4100	4735	4-16d
20	5.7	18945	2740	2331	5.3	NA	2190	NA	2675	5-16d	NA	4285	NA	4890	5-16d
22	6.0	20855	2935	2904	5.3	NA	2345	NA	2830	6-16d	NA	5235	NA	5840	11-16d
24	6.3	22755	3060	3549	5.3	NA	2345	NA	2830	6-16d	NA	5425	NA	6155	13-16d
26	6.5	24645	2900	4266	5.3	NA	2450	NA	2900	7-16d	NA (7)	5800(7)	NA (7)	5800(7)	14-16d
28	6.8	26520	2900	5059	5.3	NA	2450	NA	2900	8-16d	NA (7)	5800(7)	NA (7)	5800(7)	15-16d
30	7.1	28380	2900	5930	5.3	NA	2450	NA	2900	8-16d	NA (7)	5800(7)	NA (7)	5800(7)	17-16d
TJI/HD90															
11-7/8	5.4	14075	2320	826	6.0	1835(9)	2320(9)	2150	2320	4-16d	3995	4650	4690	5345	4-16d
14	5.7	16920	2565	1232	6.0	1835(9)	2565(9)	2150	2565	6-16d	3995	4980	4690	5670	6-16d
16	6.0	19550	2790	1695	6.0	1835(9)	2790(9)	2150	2790	6-16d	3995	4980	4690	5670	6-16d
18	6.3	22150	3020	2239	6.0	1835(9)	3020(9)	2150	3020	8-16d	3995	5310	4690	6000	8-16d
20	6.7	24725	3250	2866	6.0	NA (9)	3250(9)	NA	3250	10-16d	NA	5425	NA	6330	10-16d
22	7.0	27280	3480	3579	6.0	NA (9)	3475(9)	NA	3480	10-16d	NA	5425	NA	6330	10-16d
24	7.3	29815	3710	4380	6.0	NA (9)	3500(9)(11)	NA	3710	12-16d	NA	5425	NA	6655	12-16d
26	7.6	32330	3940	5272	6.0	NA (9)	3500(9)(11)	NA	3940	14-16d	NA (7)	6985(7)	NA (7)	7675(7)	14-16d
28	7.9	34830	4165	6258	6.0	NA (9)	3500(9)(11)	NA	4165	14-16d	NA (7)	6985(7)	NA (7)	7675(7)	14-16d
30	8.2	37310	4375	7339	6.0	NA (9)	3500(9)(11)	NA	4375	16-16d	NA (7)	7310(7)	NA (7)	8005(7)	16-16d
32	8.5	39785	4375	8519	6.0	NA (9)	3500(9)(11)	NA	4375	18-16d	NA (7)	7640(7)	NA (7)	8335(7)	18-16d
TJI/HS90															
11-7/8	6.0	16050	2320	900	6.0	1835(9)	2320(9)	2150	2320	4-16d	3995	4650	4690	5345	4-16d
14	6.3	19425	2565	1355	6.0	1835(9)	2565(9)	2150	2565	6-16d	3995	4980	4690	5670	6-16d
16	6.6	22550	2790	1876	6.0	1835(9)	2790(9)	2150	2790	6-16d	3995	4980	4690	5670	6-16d
18	7.0	25640	3020	2488	6.0	1835(9)	3020(9)	2150	3020	8-16d	3995	5310	4690	6000	8-16d
20	7.3	28695	3250	3195	6.0	NA (9)	3250(9)	NA	3250	10-16d	NA	5425	NA	6330	10-16d
22	7.6	31725	3480	3998	6.0	NA (9)	3475(9)	NA	3480	10-16d	NA	5425	NA	6330	10-16d
24	7.9	34730	3710	4901	6.0	NA (9)	3500(9)(11)	NA	3710	12-16d	NA	5425	NA	6655	12-16d
26	8.2	37715	3940	5905	6.0	NA (9)	3500(9)(11)	NA	3940	14-16d	NA (7)	6985(7)	NA (7)	7675(7)	14-16d
28	8.5	40680	4165	7014	6.0	NA (9)	3500(9)(11)	NA	4165	14-16d	NA (7)	6985(7)	NA (7)	7675(7)	14-16d
30	8.8	43630	4375	8230	6.0	NA (9)	3500(9)(11)	NA	4375	16-16d	NA (7)	7310(7)	NA (7)	8005(7)	16-16d
32	9.1	46560	4375	9555	6.0	NA (9)	3500(9)(11)	NA	4375	18-16d	NA (7)	7640(7)	NA (7)	8335(7)	18-16d

Footnotes For Table 2

1. Refer to **Figure 3** for web stiffener details.
2. Deflection is calculated as follows:

$$\text{Uniform Load: } \Delta = \frac{22.5WL^4}{EI} + \frac{12WL^2}{Kdx10^5} \quad \text{Concentrated load to mid span: } \Delta = \frac{36PL^3}{EI} + \frac{24PL}{Kdx10^5}$$

Where:

- P = Concentrated load, pounds. d = Out-to-out depth of joist, inches.
W = Uniform load in pounds per lineal foot. EI = From table.
L = Clear span in feet. K = From table.

3. The stated allowable design properties are for loads of normal duration. Adjustments to the allowable design values shall be in accordance with the applicable code, with the exception noted in footnote 10 below.
4. Interpolation between bearing lengths and joist depths is permitted for allowable design reactions.
5. The minimum bearing length is permitted to be reduced for joists supported by hangers if supplemental nail attachment is provided to the web stiffener.
6. Allowable bearing lengths have been determined based on Trus Joist products. Allowable bearing on supporting members must be checked.
7. Areas indicate allowable bearing reactions for 5-1/4-inch and 7-inch bearing lengths at intermediate supports.
8. Joist weights shown are calculated on a rational basis, are based on the heavier of Eastern or Western Species products and are suitable for dead load calculation. Contact the producing plant for shipping weight information if needed.
9. Applicable to TJI/HD90 and TJI/HS90 joists only. Areas indicate allowable bearing reactions for a 2-1/2 inch bearing length at end supports. 1-3/4 inch end bearing lengths are also permitted; with allowable reactions of 1600 lbs. without web stiffeners for depths up to and including 18 inches; with web stiffeners the allowable reaction is 2255 lbs for the 11-7/8 inch depth and 2450 lbs. for all other depths.
10. The resistive moment capacities listed in Table 2 may not be increased by any code allowed repetitive-member use factor.

11. Applicable to TJI/HD90 and TJI/HS90 joists only. Reaction capacities at a 3 inch bearing length (interpolated as per note 4 above) may be increased 510 lbs. when supported by Simpson Strong-Tie Co. HW1 or WPU joist hangers with a minimum of 4 10d common nails installed through the joist hanger stirrups and into the joist web stiffener and web.

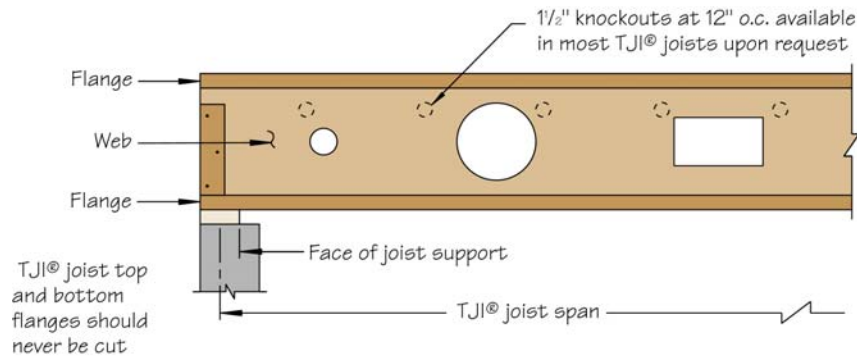


Figure 1. Allowable Hole Size and Location for the TJI/L45, TJI/L65, TJI/L90, TJI/H90, TJI/HD90 and TJIHS90 Joists ONLY.

Hole Factors and Locations Chart

Round Hole Size (inches)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Rectangular Hole Size (inches)	1 1/4	1 3/4	2 1/4	3	3 1/2	4	4 3/4	5 1/4	6	6 1/2	7	7 3/4	8 1/4	9	9 1/2	10	10 3/4	11 1/4	12
Joist depth (inches)	11 7/8	A	A	B	C	E													
	14	A	A	B	C	C	D	E											
	16	A	A	A	B	C	C	D	E	E									
	18	4"	1'-3"	A	A	B	C	C	D	E	E								
	20	4"	1'-3"	A	A	B	B	C	C	D	D	E	E						
	22	4"	1'-3"	1'-3"	A	A	B	B	C	C	D	D	E	E					
	24	4"	4"	1'-3"	A	A	A	B	B	C	C	D	D	E	E	E			
	26	4"	4"	1'-3"	A	A	A	B	B	B	C	C	D	D	D	E	E		
	28	4"	4"	1'-3"	1'-3"	A	A	A	B	B	B	C	C	D	D	D	E	E	
	30	4"	4"	4"	1'-3"	1'-3"	A	A	A	B	B	B	C	C	C	D	D	E	E

Hole Location Chart

Joist Span (center-to-center of support, feet)	Hole Factor				
	A	B	C	D	E
14	1'-3"	2'-0"	2'-6"	3'-9"	5'-0"
15	1'-3"	2'-0"	3'-0"	4'-0"	5'-3"
16	1'-3"	2'-3"	3'-3"	4'-6"	5'-9"
17	1'-6"	2'-9"	3'-9"	5'-0"	6'-3"
18	1'-6"	3'-0"	4'-3"	5'-6"	6'-9"
19	1'-9"	3'-0"	4'-3"	5'-6"	7'-0"
20	1'-9"	3'-0"	4'-3"	5'-6"	7'-0"
21	2'-0"	3'-0"	4'-3"	5'-9"	7'-3"
22	2'-0"	3'-0"	4'-3"	5'-9"	7'-3"
23	2'-0"	3'-3"	4'-3"	5'-9"	7'-6"
24	2'-3"	3'-3"	4'-6"	5'-9"	7'-6"
25	2'-3"	3'-6"	4'-9"	5'-9"	7'-9"
26	2'-3"	3'-9"	4'-9"	6'-0"	7'-9"
27	2'-6"	3'-9"	5'-0"	6'-3"	7'-9"
28	2'-6"	4'-0"	5'-3"	6'-6"	8'-0"
29	2'-6"	4'-0"	5'-6"	6'-9"	8'-3"
30	2'-9"	4'-3"	5'-9"	7'-0"	8'-6"
31	3'-0"	4'-3"	5'-9"	7'-3"	8'-9"
32	3'-0"	4'-6"	6'-0"	7'-6"	9'-3"
33	3'-0"	4'-9"	6'-3"	7'-9"	9'-6"
34	3'-0"	5'-0"	6'-6"	8'-0"	9'-9"
35	3'-3"	5'-0"	6'-6"	8'-3"	10'-0"
36	3'-3"	5'-0"	6'-9"	8'-6"	10'-3"

Notes to Figure 1

- Charts are based on simple spans and uniform load applications or applicable building code provisions for concentrated loads (2000 lbs. over 2.5 square feet) with 25 psf dead load and 20 psf partition load.
- For uniformly loaded multiple span applications holes must be located 1.0 inch farther from the support for each foot of joist span, than the values indicated in the charts.
- Holes are not allowed in cantilever areas unless specifically designed by a qualified design professional.
- Where more than one hole is to be cut in the web, the clear distance between holes must be twice the length of the longest dimension of the largest adjacent hole.
- Hole sizes shown are hole sizes, not duct sizes.
- Rectangular hole sizes are based on measurement of the longest side.

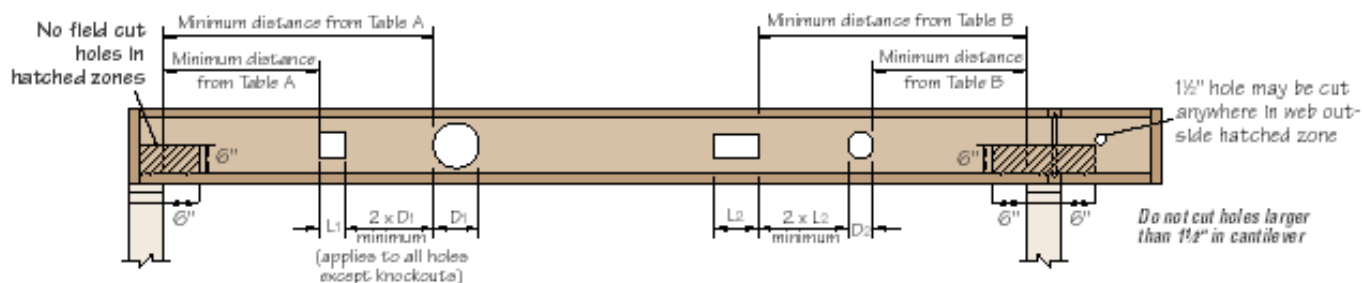


Figure 2. Allowable Hole Size and Location for the TJI 110, TJI 210, TJI 230, TJI 360 and TJI 560 Series Joists

Table A – Minimum Distance From Inside Face of End Support to Nearest Edge of Hole

Joist Depth (inches)	TJI Joist Series	Round Hole Size (inches)							Square or Rectangular Hole Size (inches)						
		2	3	4	6 1/2	8 7/8	11	13	2	3	4	6 1/2	8 7/8	11	13
9 1/2	TJI 110	1'-0"	1'-6"	2'-0"	5'-0"				1'-0"	1'-6"	2'-6"	4'-6"			
	TJI 210	1'-0"	1'-6"	2'-0"	5'-0"				1'-0"	2'-0"	2'-6"	5'-0"			
	TJI 230	1'-0"	2'-0"	2'-6"	5'-6"				1'-0"	2'-0"	3'-0"	5'-0"			
11 1/8	TJI 110	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"			1'-0"	1'-0"	1'-6"	4'-6"	6'-0"		
	TJI 210	1'-0"	1'-0"	1'-0"	2'-6"	5'-6"			1'-0"	1'-0"	2'-0"	5'-0"	6'-6"		
	TJI 230	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"			1'-0"	1'-0"	2'-0"	5'-6"	7'-0"		
	TJI 360	1'-0"	1'-0"	1'-6"	4'-6"	7'-0"			1'-0"	1'-0"	2'-6"	6'-6"	7'-6"		
	TJI 560	1'-0"	1'-0"	1'-6"	5'-0"	8'-0"			1'-0"	2'-0"	3'-6"	7'-0"	8'-0"		
14	TJI 110	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"		1'-0"	1'-0"	1'-0"	3'-6"	6'-0"	8'-0"	
	TJI 210	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"		1'-0"	1'-0"	1'-0"	4'-0"	6'-6"	8'-6"	
	TJI 230	1'-0"	1'-0"	1'-0"	1'-6"	3'-6"	6'-6"		1'-0"	1'-0"	1'-0"	4'-0"	7'-0"	9'-0"	
	TJI 360	1'-0"	1'-0"	1'-0"	2'-6"	5'-6"	8'-0"		1'-0"	1'-0"	1'-0"	5'-6"	8'-0"	9'-6"	
	TJI 560	1'-0"	1'-0"	1'-0"	2'-6"	6'-0"	9'-0"		1'-0"	1'-0"	1'-6"	6'-6"	9'-0"	10'-0"	
16	TJI 210	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	3'-6"	6'-0"	1'-0"	1'-0"	1'-0"	2'-6"	6'-6"	8'-0"	10'-6"
	TJI 230	1'-0"	1'-0"	1'-0"	1'-0"	2'-0"	4'-0"	6'-6"	1'-0"	1'-0"	1'-0"	3'-0"	7'-0"	9'-0"	11'-0"
	TJI 360	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"	9'-0"	1'-0"	1'-0"	1'-0"	4'-0"	9'-0"	10'-0"	11'-6"
	TJI 560	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-6"	10'-0"	1'-0"	1'-0"	1'-0"	5'-0"	10'-0"	11'-0"	12'-0"

See notes below Table B

Table B – Minimum Distance From Inside Face of Intermediate or Cantilever Support to Nearest Edge of Hole

Joist Depth (inches)	TJI Joist Series	Round Hole Size (inches)							Square or Rectangular Hole Size (inches)						
		2	3	4	6 1/2	8 7/8	11	13	2	3	4	6 1/2	8 7/8	11	13
9 1/2	TJI 110	1'-6"	2'-6"	3'-0"	7'-6"				1'-6"	2'-6"	3'-6"	6'-6"			
	TJI 210	2'-0"	2'-6"	3'-6"	7'-6"				2'-0"	3'-0"	4'-0"	7'-0"			
	TJI 230	2'-6"	3'-0"	4'-0"	8'-0"				2'-6"	3'-0"	4'-6"	7'-6"			
11 1/8	TJI 110	1'-0"	1'-0"	1'-6"	4'-0"	8'-0"			1'-0"	1'-6"	2'-6"	6'-6"	9'-0"		
	TJI 210	1'-0"	1'-0"	2'-0"	4'-6"	9'-0"			1'-0"	2'-0"	3'-0"	7'-6"	10'-0"		
	TJI 230	1'-0"	2'-0"	2'-6"	5'-0"	9'-6"			1'-0"	2'-6"	3'-6"	8'-0"	10'-0"		
	TJI 360	2'-0"	3'-0"	4'-0"	7'-0"	11'-0"			2'-0"	3'-6"	5'-0"	9'-6"	11'-0"		
	TJI 560	1'-6"	3'-0"	4'-6"	8'-0"	12'-0"			3'-0"	4'-6"	6'-0"	10'-6"	12'-0"		
14	TJI 110	1'-0"	1'-0"	1'-0"	2'-0"	4'-6"	8'-0"		1'-0"	1'-0"	1'-0"	5'-0"	9'-0"	12'-0"	
	TJI 210	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"	9'-0"		1'-0"	1'-0"	2'-0"	6'-0"	10'-0"	12'-6"	
	TJI 230	1'-0"	1'-0"	1'-0"	3'-0"	5'-6"	10'-0"		1'-0"	1'-0"	2'-6"	6'-0"	10'-6"	13'-0"	
	TJI 360	1'-0"	1'-0"	2'-0"	5'-6"	8'-6"	12'-6"		1'-0"	2'-0"	4'-0"	9'-0"	12'-0"	14'-0"	
	TJI 560	1'-0"	1'-0"	1'-6"	5'-6"	9'-6"	13'-6"		1'-0"	3'-0"	5'-0"	10'-0"	13'-6"	15'-0"	
16	TJI 210	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	5'-6"	9'-6"	1'-0"	1'-0"	1'-0"	4'-6"	9'-6"	12'-6"	15'-6"
	TJI 230	1'-0"	1'-0"	1'-0"	1'-6"	4'-0"	6'-6"	10'-6"	1'-0"	1'-0"	1'-0"	5'-0"	10'-6"	13'-0"	16'-0"
	TJI 360	1'-0"	1'-0"	1'-0"	3'-0"	6'-6"	10'-0"	13'-6"	1'-0"	1'-0"	2'-0"	7'-6"	13'-0"	14'-6"	17'-0"
	TJI 560	1'-0"	1'-0"	1'-0"	2'-6"	7'-0"	11'-0"	15'-0"	1'-0"	1'-0"	3'-6"	9'-0"	14'-6"	16'-0"	18'-0"

NOTES:

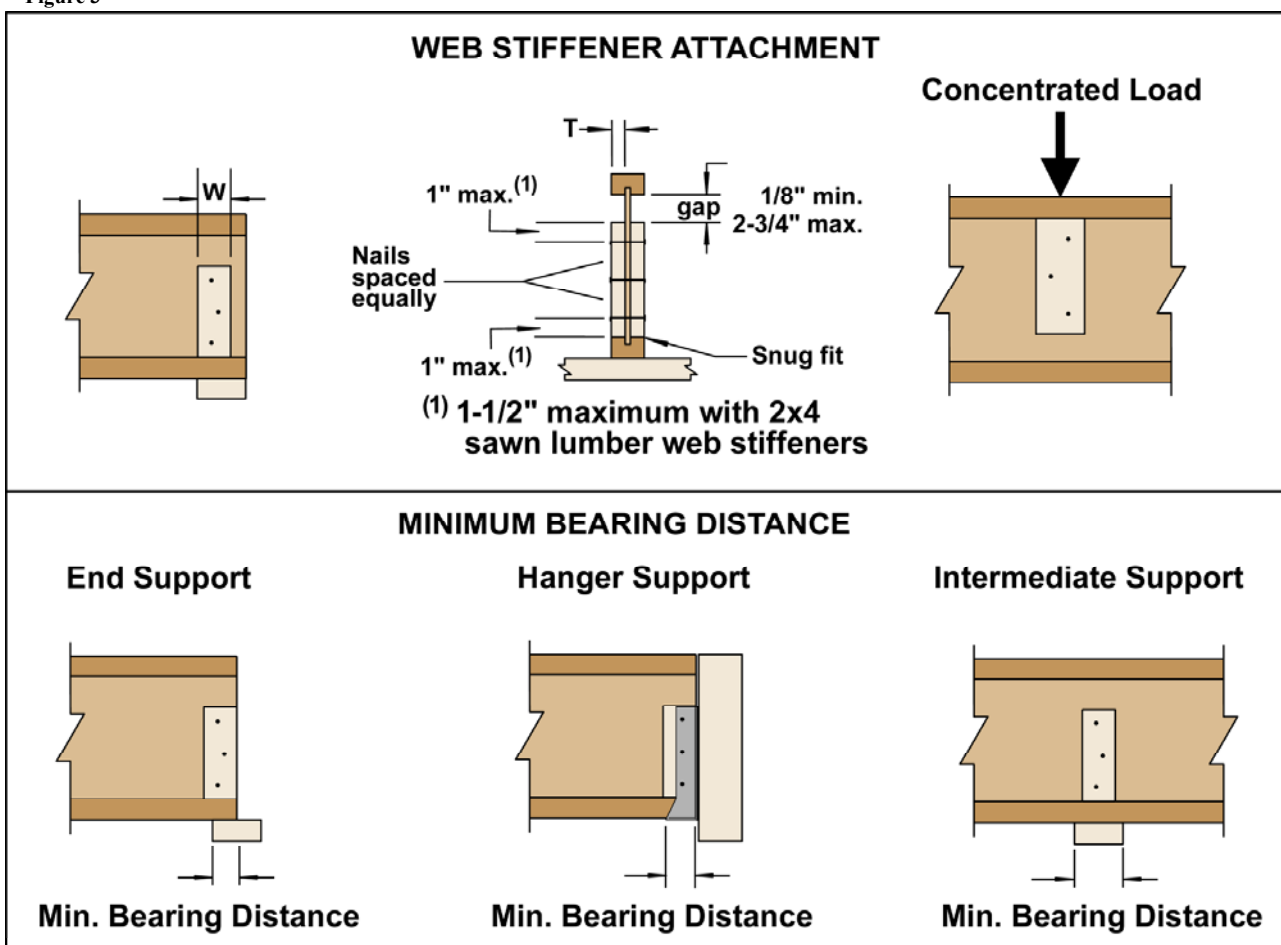
- The clear distance between multiple holes must be twice the length of the longest dimension of the largest hole.
- Holes may be located vertically anywhere within the web. Leave 1/8-inch of web minimum at top and bottom of hole.
- Tables A and B are based on uniform load applications, within the limitations of the applicable Trus Joist literature.
- TJI Joists are manufactured with 1-1/2-inch diameter perforated knockouts in the web at approximately 12 inches on center along the length of the joist.
- For simple span (5 foot minimum) uniformly loaded joists one maximum size hole may be located in the web at the center of the joist span provided no other holes occur in the joist.

FIGURE 3 – WEB STIFFENER NOTES AND DETAILS

1. Web stiffeners shall be installed at bearing points as required in **Table 2**.
2. Web stiffeners shall be installed at points of concentrated loads greater than 1500 pounds and are to be nailed in accordance with the intermediate reaction schedule in **Table 2**.
3. Web stiffeners are to be installed on each side of the web as shown, with nails equally spaced vertically.
4. A gap shall be left at the top of web stiffeners as shown at all bearing conditions. In the case of concentrated loads, web stiffeners are required as shown and the gap shall be at the bottom.
5. Web stiffener material shall be sheathing meeting the requirements of PS-1 or PS-2 with the face grain parallel to the long axis.
6. Some hangers require web stiffeners to comply with nailing requirements through side plates.
7. If web stiffeners are not used in hanger support, the side of the hanger shall extend up to laterally support the top flange.

Web stiffener specifications are as follows:

TJI Joist Series	Minimum Dimensions		Grade
	"W" (inches)	"T" (inches)	
TJI 110, TJI/L45	2-5/16	5/8	See Note 5
TJI 210	2-5/16	23/32	See Note 5
TJI 230, TJI360, TJI/L65	2-5/16	7/8	See Note 5
TJI 560, TJI/L90, TJIH90	3-1/2	1-1/2	Construction Grade 2x4
TJI/HD90, TJI/HS90	3-1/2	1-1/2	1.3E TimberStrand LSL

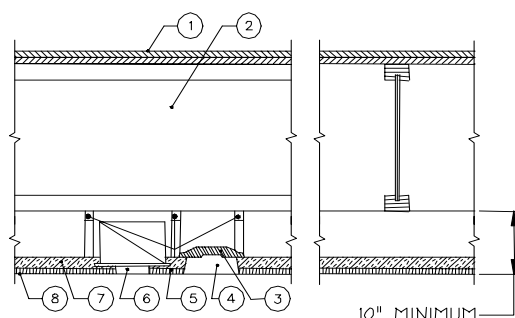
Figure 3

TESTS AND RESULTS

Tests were performed to confirm theoretical analysis and to develop design criteria. Test information is on file with the Department.

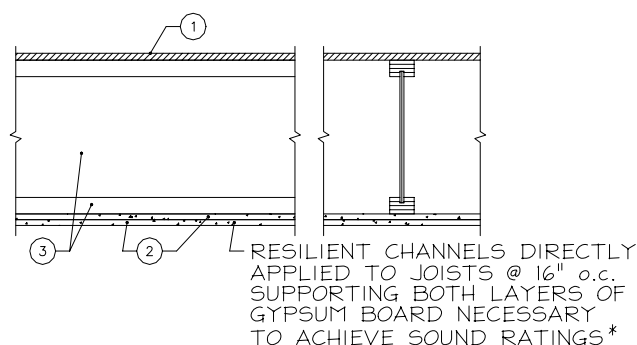
The TJI Series Joists are approved for use in a 1-hour fire endurance assembly as shown in the details below (A through F).

FIGURE 4 – ONE-HOUR FIRE-RESISTIVE ASSEMBLY DETAILS



ASSEMBLY A

1. Double Wood Floor.
2. TJI Joist with minimum 1-1/2 inch flange depth.
3. Fixture protection.
4. 24 inch x 48 inch recessed light fixture.
5. Cold-rolled channels.
6. 12 inch air diffuser.
7. Thermafiber or Fibrex-FBX or Fibrex-IF mineral wool blankets.
8. 5/8 inch thick acoustical panels 24 inches x 24 inches or 24 inches x 48 inches supported by an approved exposed fire-rated suspension system.



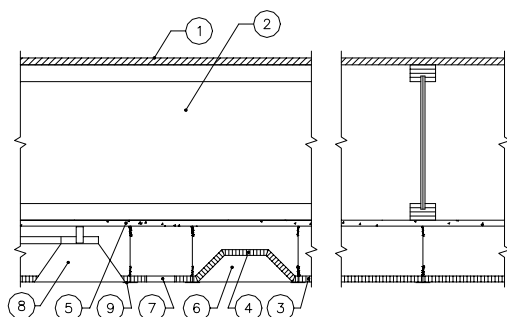
ASSEMBLY B

1. 48/24 tongue-and-groove span rated sheathing (Exposure 1).
2. Two layers of 1/2 inch thick Type X gypsum board.
3. TJI Joist.
4. Optional minimum 3-1/2 inch thick glass fiber insulation or non-combustible insulation that is rated R30 or less, with resilient channels (not shown).

Sound Test Data*

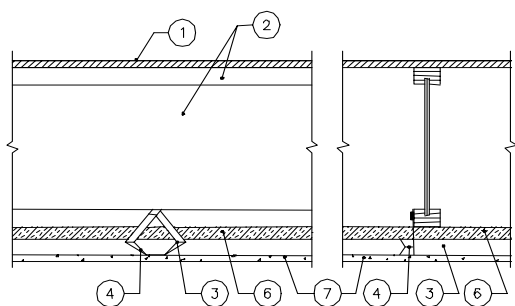
		STC = 50	
W/O Gypsum Concrete	Pad & Carpet		IIC = 60
	Tarkett Acoustiflor		IIC = 51 (1)
	Cushioned		IIC = 45
		STC = 58	
W/Gypsum Concrete	Pad & Carpet		IIC = 54
	Tarkett Acoustiflor		IIC = 54 (1)
	Armstrong Vios/Armstrong		IIC = 50 (1)
	Cambray sheet vinyl		

- (1) Requires two layers of 5/8 inch thick Type X gypsum board with minimum of 3-1/2 inch thick glass fiber insulation or non-combustible insulation that is rated R30 or less.



ASSEMBLY C

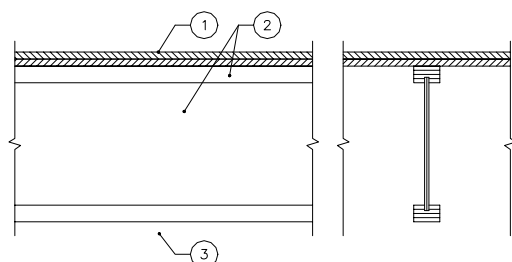
1. 48/24 tongue-and-groove span rated sheathing (Exposure 1).
2. TJI Joist.
3. 5/8 inch thick x 24 inch x 24 inch ceiling panels.
4. Fixture protection.
5. 1/2 inch thick Type X gypsum board.
6. 24 inch x 48 inch recessed light fixture.
7. 6 inch x 12 inch opening for return air.
8. 12 inch diameter diffuser opening.
9. Steel suspension grid.

**Sound Test Data:**

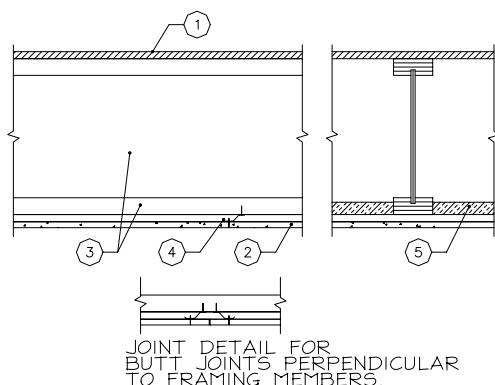
W/O Gypsum Concrete	STC = 47	
	Pad & Carpet	IIC = 54
W/Gypsum Concrete	STC = 59	
	Pad & Carpet	IIC = 54

ASSEMBLY D

1. 48/24 tongue-and-groove span rated sheathing (Exposure 1).
2. TJI Joist.
3. No. 26 gauge galvanized steel furring channel installed perpendicular to joists. Furring channels spaced 1-1/2 inches from and on each side of wallboard end joints and 24 inches on center away from end joints. Channel secured to joists with support clips (Item 4) at each joist location. At channel splices, adjacent pieces overlapped 6 inches and tied with double strand of No. 18 SWG galvanized steel wire at each end of overlap.
4. Simpson Strong-Tie Co. Type CSC support clips to be used to support furring channels at the intersection with each joist. Support clips nailed to side of joist bottom flange with 1-1/2 inch long No. 11 gauge nail.
5. Stabilizer strap (not shown) – 3/4 inch x 6 inch No. 24 gauge galvanized steel strap used to prevent rotation of the support clips at wallboard end joints and along walls.
6. 1 inch thick, 6 pcf minimum, Thermafiber or Fibrex-FBX or Fibrex-IF mineral wool blankets.
7. 1/2 inch thick USG Type C FIRECODE or Westroc Fireboard C gypsum board.

**ASSEMBLY E**

1. Double wood floor or a single layer of 48/24 tongue-and-groove span rated sheathing (Exposure 1).
2. TJI Joist.
3. An approved ceiling system that will provide a 40-minute finish rating.

**ASSEMBLY F**

1. 48/24 tongue-and-groove span rated sheathing (Exposure 1).
2. 5/8 inch thick USG Type C FIRECODE or Westroc Fireboard C gypsum board.
3. TJI Joist (with flange sizes 2x4 nominal or larger).
4. USG RC-1 channel at 16 inches on center.
5. Thermafiber or Fibrex-FBX or Fibrex-SAFB mineral wool batts.

TYPICAL DETAIL FOR BUTT JOINTS PERPENDICULAR TO FRAMING MEMBERS.

Lightweight concrete or gypsum concrete may be added to Assemblies A, B, C, D, E and F of this evaluation

LIMITATIONS OF APPROVAL

The TJI® Joists may be used as simple or continuous spans with maximum cantilever lengths such that the joist properties have not been exceeded.

Load tables may be used (as provided in TJI® Joist's product literature), without submitting calculations. The following information shall be shown on the plans submitted for each project: Evaluation number (200420-W), series number identification, spans, spacing, load conditions, bearing details and other information required by **Chapters Comm 20-25** or **IBC Chapter 23** of the Wisconsin Building Codes listed herein. Applications not covered by this approval and requiring special considerations may be handled by contacting a Trus Joist representative for guidance and submitted for review when required by **Chapters Comm 20-25** or **IBC Chapter 23**.

The **IBC** limitations below are in accordance with the current **Wisconsin Amended ICC Code**:

Installation: Installation of TJI® Joists shall be in accordance with the manufacturers published installation instructions and this evaluation. If a conflict between the manufacturer's instructions and this evaluation occur, the conditions set forth in this evaluation shall govern.

Identification: All TJI® Joists shall be identified by means of a stamp indicating the manufacturer's name and/or trademark, plant number, the product trade name, production date and the third-party inspection agency logo (PSF Corporation).

The cumulative effects of short-term loads, such as snow, shall be considered in determining the duration of the load. For snow load duration of load factor shall not exceed 1.15.

The design properties are for dry-use conditions and under no circumstances shall the joist be permanently exposed to the weather.

TJI® Joist flanges shall not be cut except as noted in the manufacturers published installation instructions and this evaluation.

Trus® Joist's descriptive literature indicating joist composition, dimensions, installation details including locations and details of blocking, bridging, joist cuts and this evaluation shall be furnished upon request to code authorities having jurisdiction.

This approval will be valid through December 31, 2009, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: August 2, 2004 By: _____

Lee E. Finley, Jr.
Product & Material Review
Integrated Services Bureau